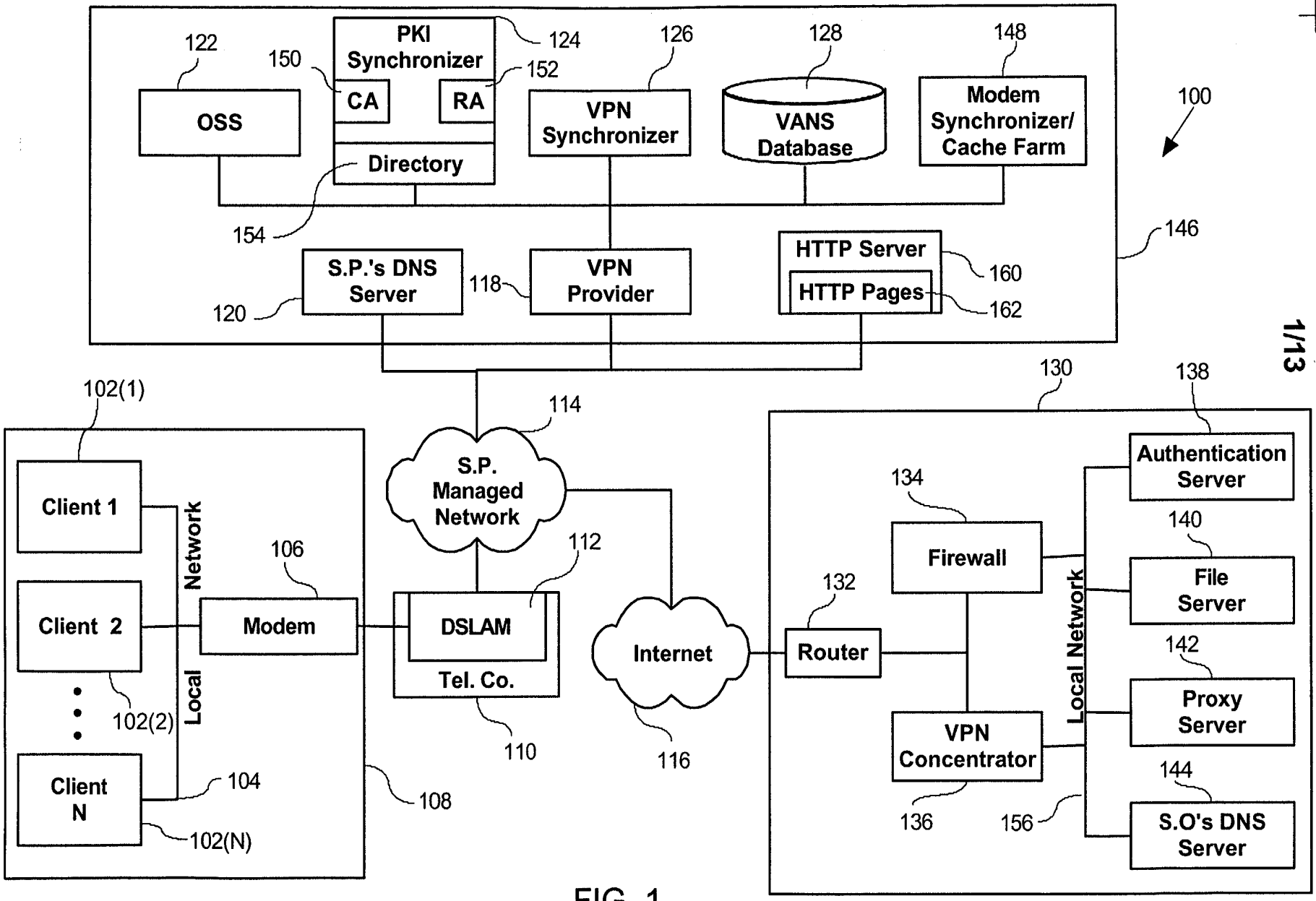
PKI Synchronizer
CA
RA
Directory
OSS
VPN Synchronizer
VANS Database
Modem Synchronizer/ Cache Farm
S.P.'s DNS Server
VPN Provider
HTTP Server
HTTP Pages
100
102(1)
Client 1
Client 2
102(2)
Client N
102(N)
Local Network
Modem
106
104
108
S.P. Managed Network
114
DSLAM
112
Tel. Co.
110
Internet
116
130
138
Authentication Server
134
Firewall
140
File Server
132
Router
142
Proxy Server
VPN Concentrator
136
144
S.O's DNS Server
156
Local Network
122
150
124
152
126
128
148
154
146
118
120
160
162

FIG. 1

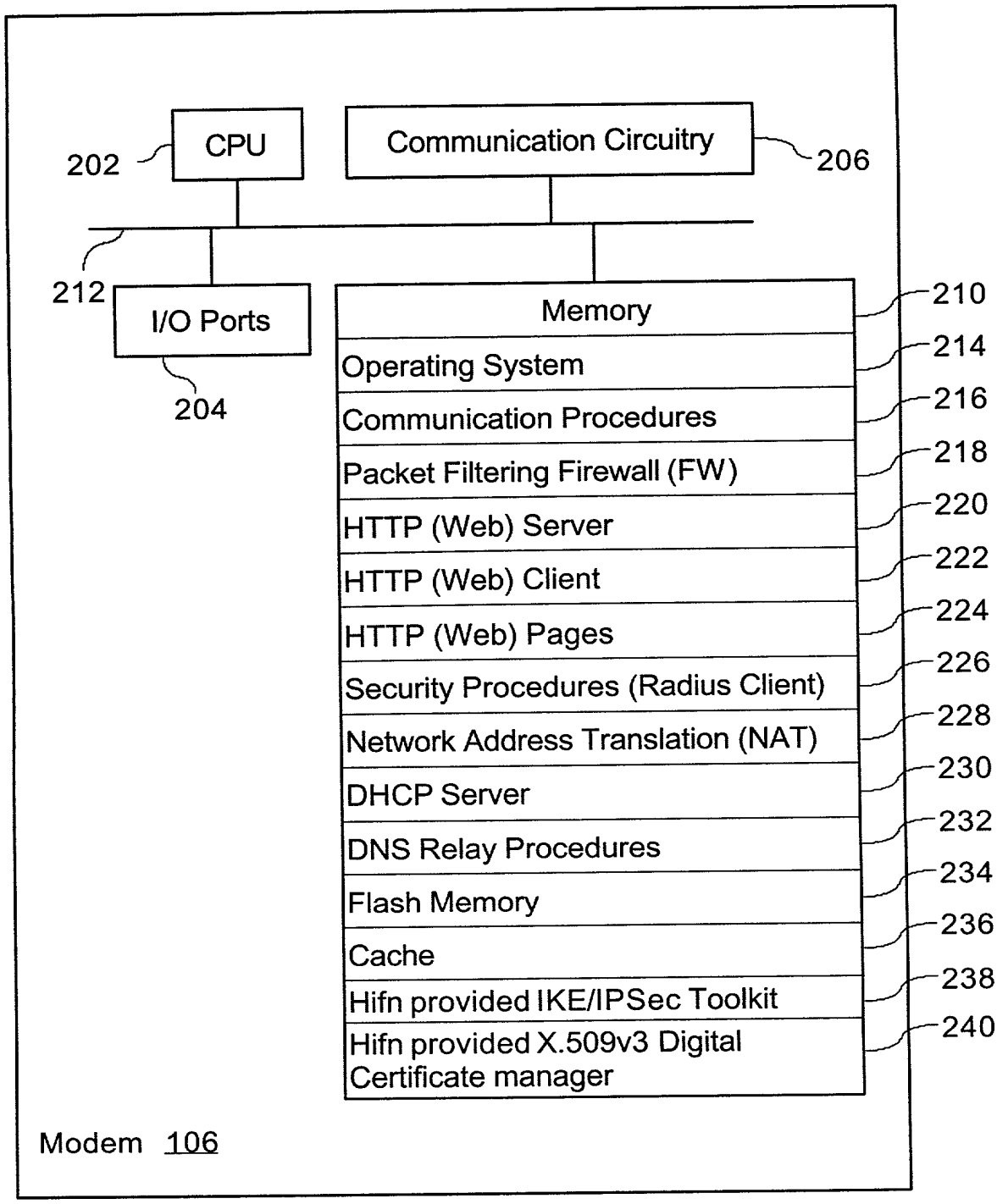
CPU
202
Communication Circuitry
206
212
I/O Ports
204
Memory
210
Operating System
214
Communication Procedures
216
Packet Filtering Firewall (FW)
218
HTTP (Web) Server
220
HTTP (Web) Client
222
HTTP (Web) Pages
224
Security Procedures (Radius Client)
226
Network Address Translation (NAT)
228
DHCP Server
230
DNS Relay Procedures
232
Flash Memory
234
Cache
236
Hifn provided IKE/IPSec Toolkit
238
Hifn provided X.509v3 Digital Certificate manager
240
Modem 106

FIG. 2

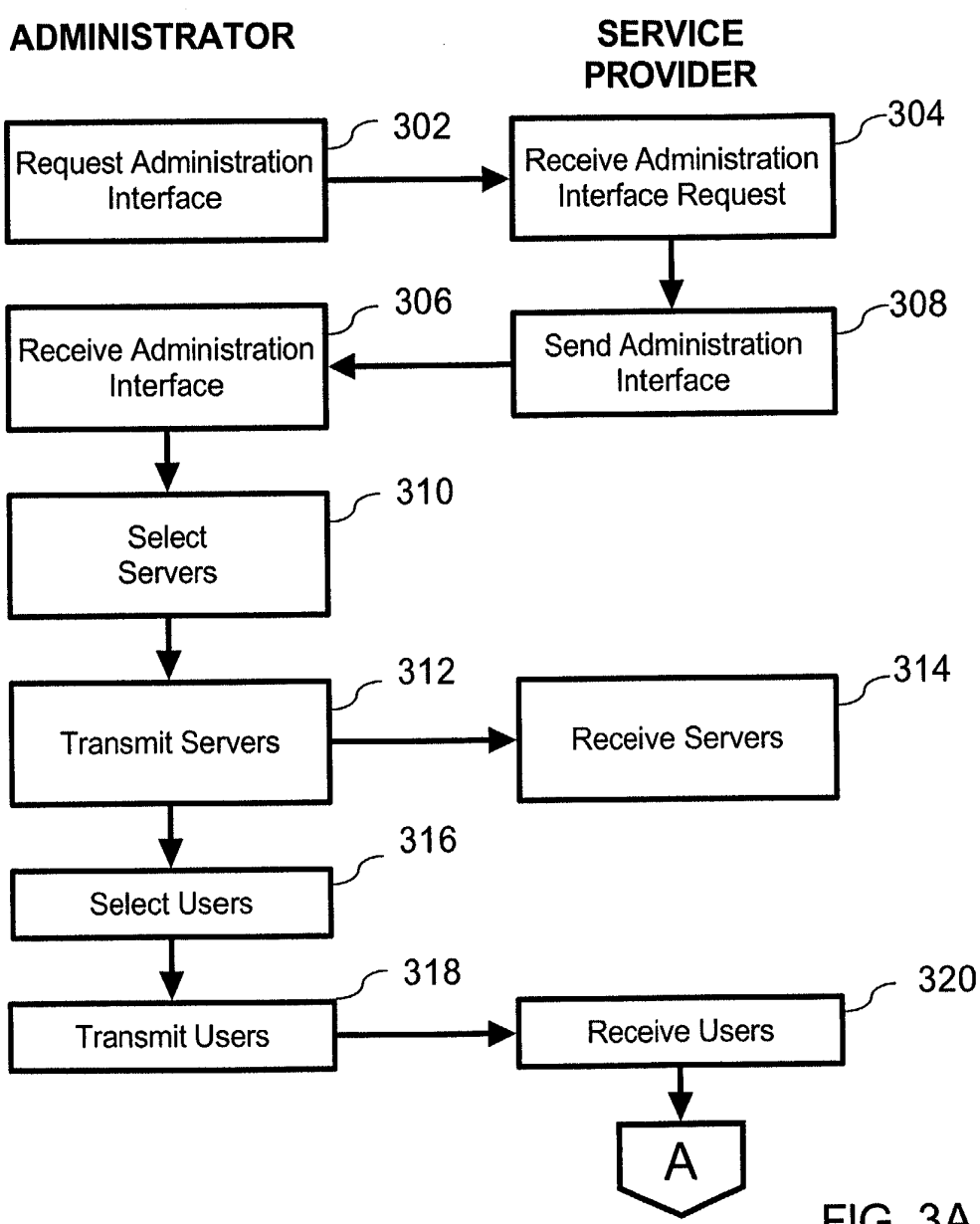
ADMINISTRATOR
SERVICE PROVIDER
MODEM
SERVER-SIDE SYSTEM
300
Request Administration Interface
302
Receive Administration Interface Request
304
Receive Administration Interface
306
Send Administration Interface
308
Select Servers
310
Transmit Servers
312
Receive Servers
314
Select Users
316
Transmit Users
318
Receive Users
320
A

FIG. 3A

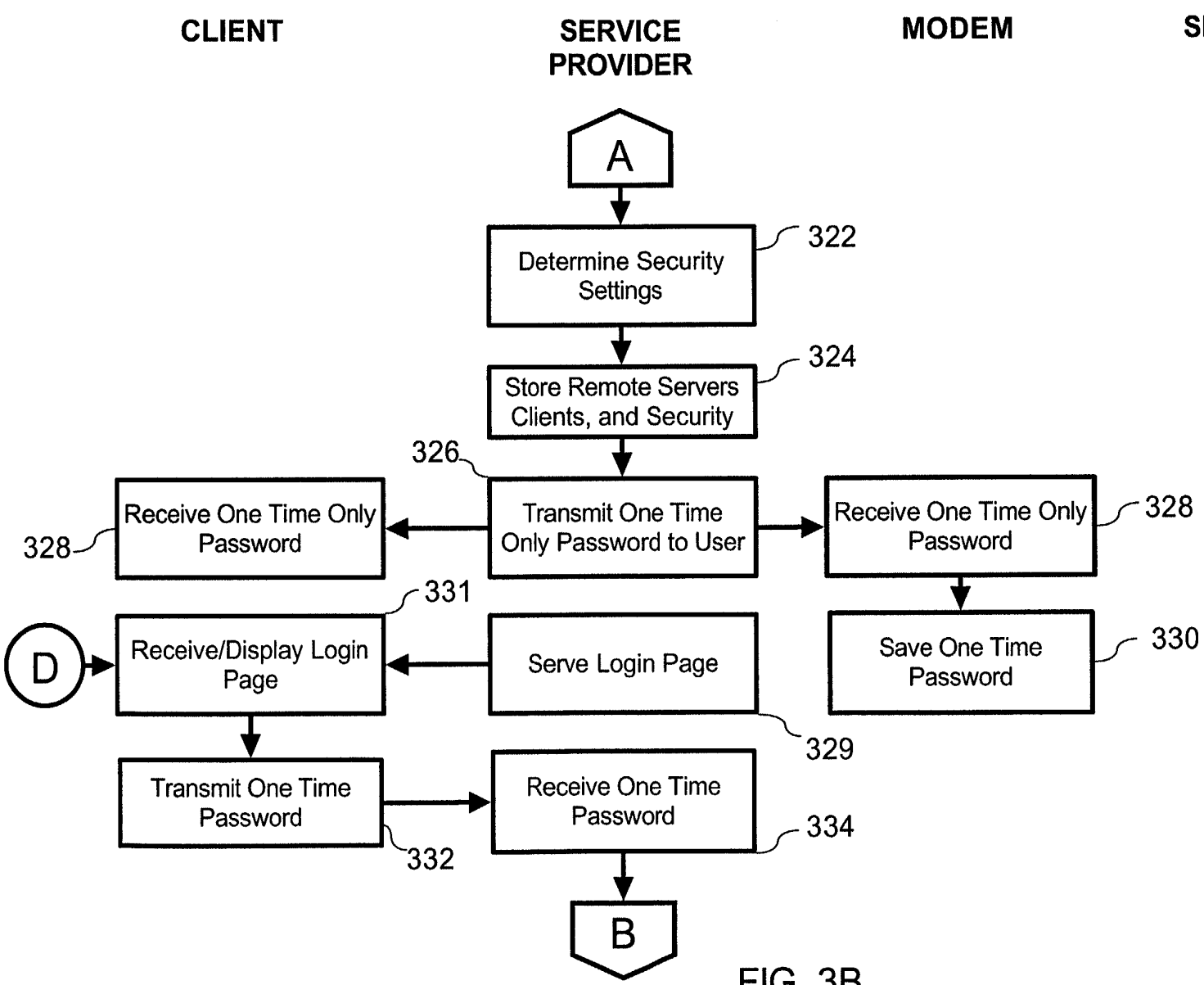
CLIENT
SERVICE PROVIDER
MODEM
SERVER-SIDE SYSTEM
A
Determine Security Settings
322
Store Remote Servers Clients, and Security
324
326
Transmit One Time Only Password to User
Receive One Time Only Password
328
Receive One Time Only Password
328
Save One Time Password
330
D
Receive/Display Login Page
331
Serve Login Page
329
Transmit One Time Password
332
Receive One Time Password
334
B

FIG. 3B

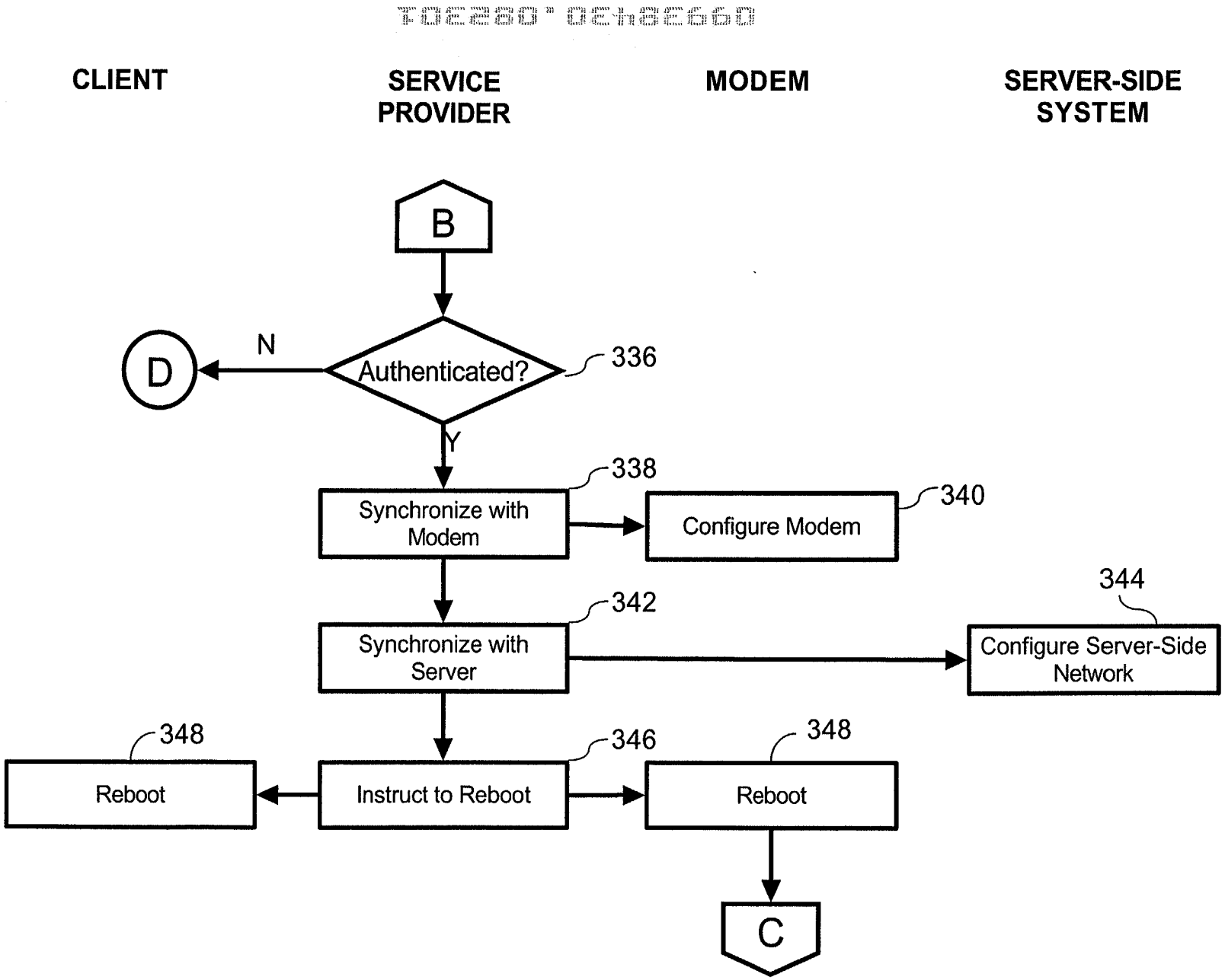
CLIENT
SERVICE PROVIDER
MODEM
SERVER-SIDE SYSTEM
B
Authenticated?
336
N
D
Y
338
Synchronize with Modem
340
Configure Modem
342
Synchronize with Server
344
Configure Server-Side Network
348
Reboot
346
Instruct to Reboot
348
Reboot
C

FIG. 3C

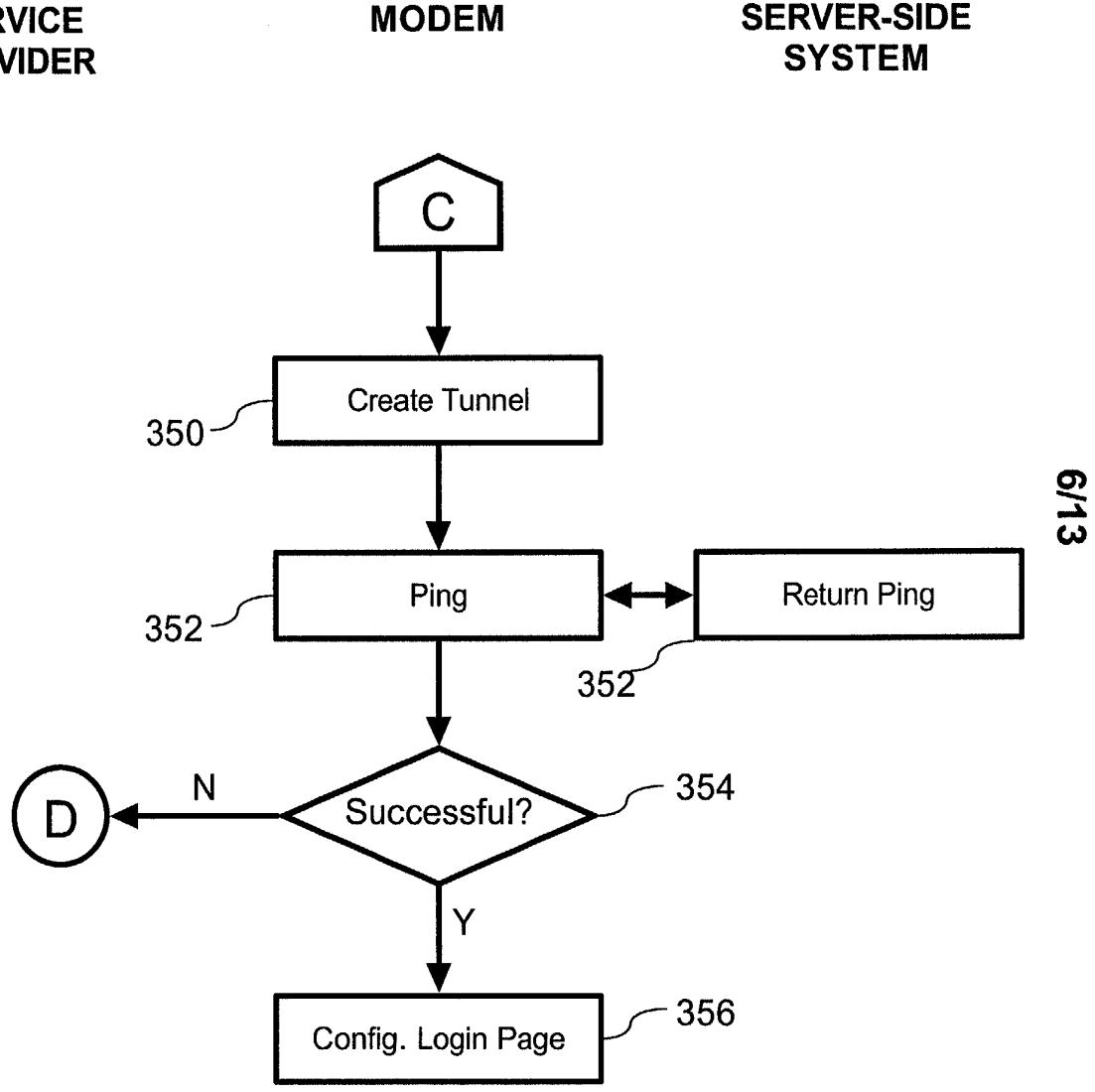
CLIENT
SERVICE PROVIDER
MODEM
SERVER-SIDE SYSTEM
C
Create Tunnel
350
Ping
352
Return Ping
352
N
D
Successful?
354
Y
Config. Login Page
356

FIG. 3D

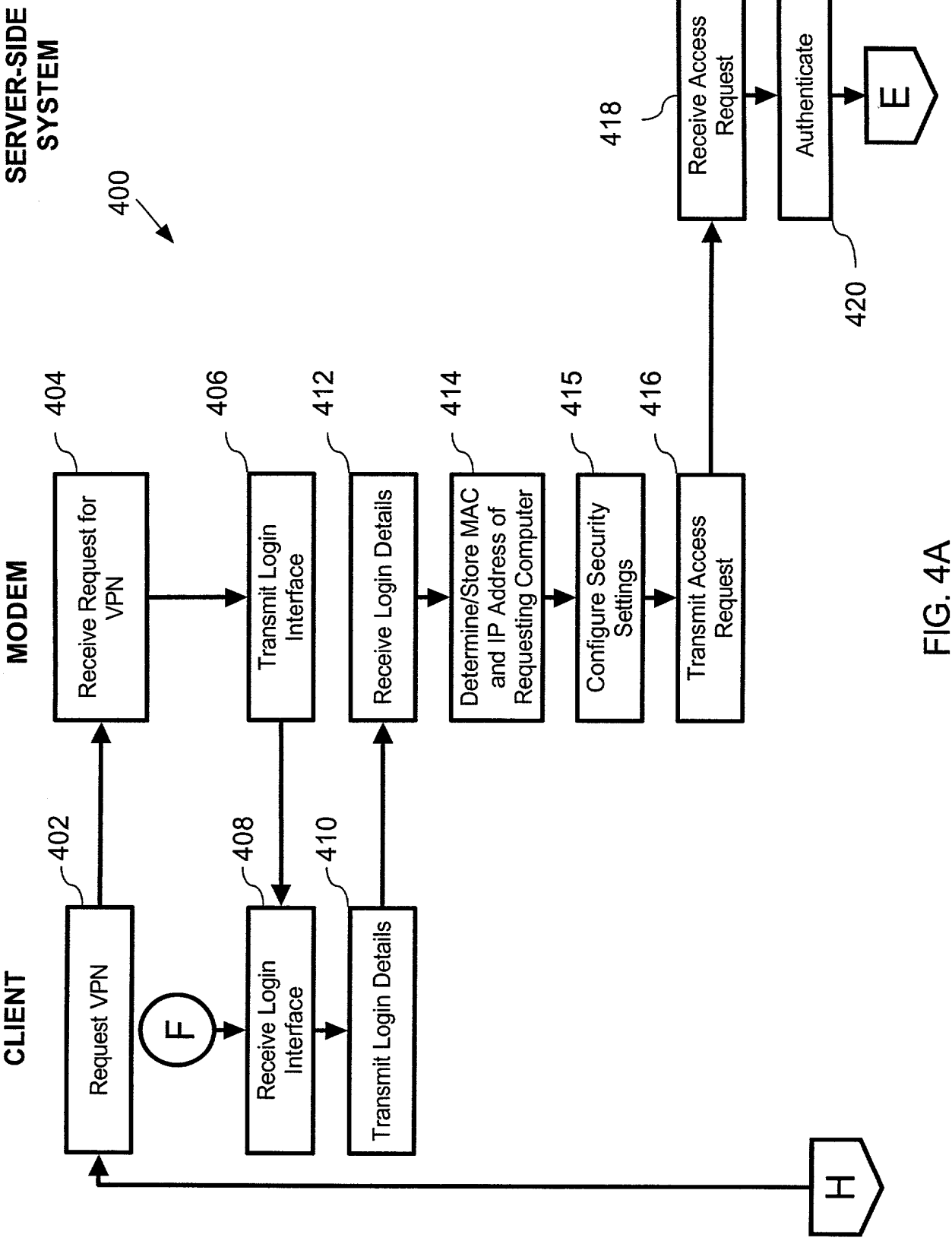
SERVER-SIDE SYSTEM
400
CLIENT
MODEM
Request VPN
402
Receive Request for VPN
404
Transmit Login Interface
406
Receive Login Interface
408
Transmit Login Details
410
Receive Login Details
412
Determine/Store MAC and IP Address of Requesting Computer
414
Configure Security Settings
415
Transmit Access Request
416
Receive Access Request
418
Authenticate
420
F
E
H

FIG. 4A

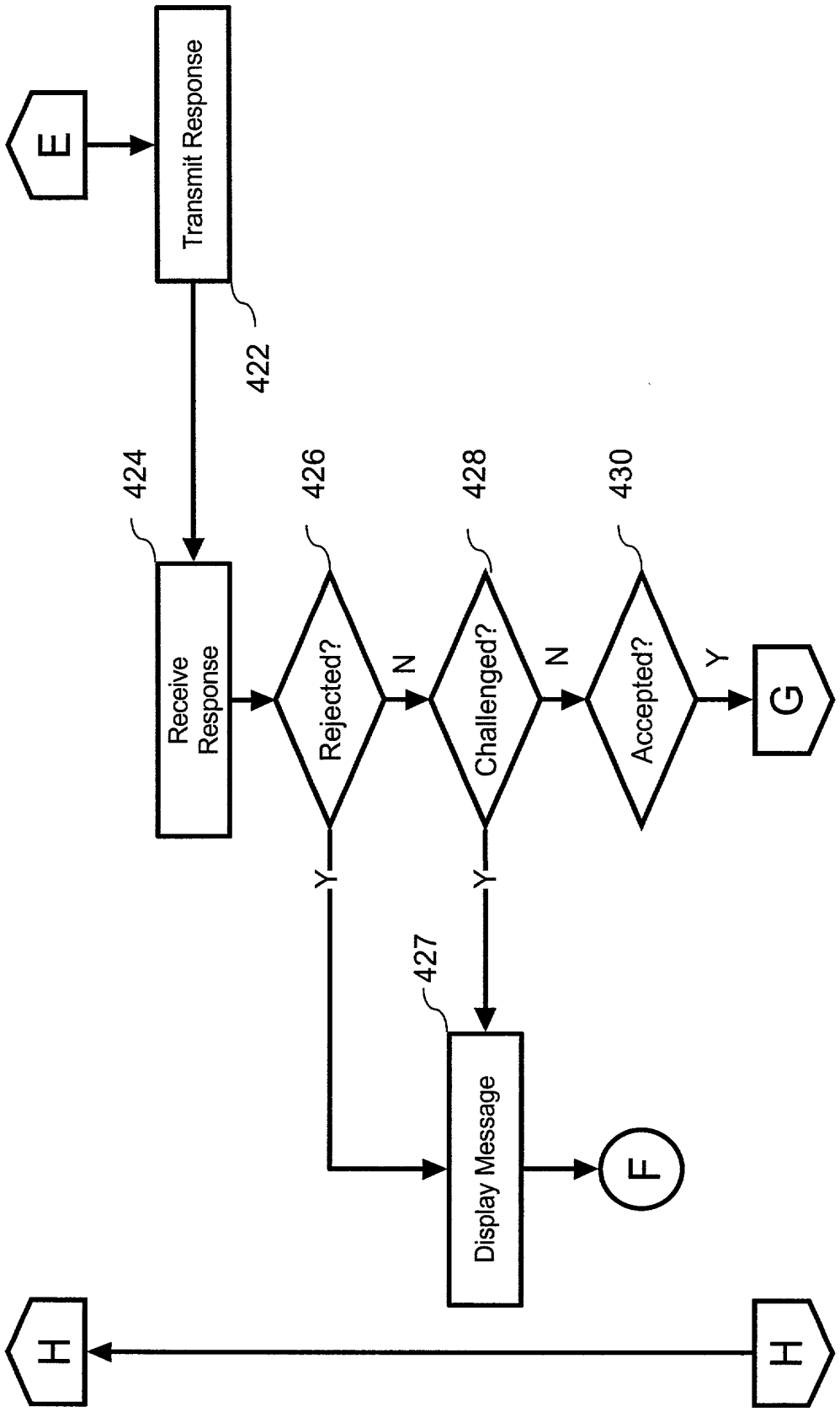
SERVER-SIDE SYSTEM
MODEM
CLIENT
E
Transmit Response
422
424
Receive Response
426
Rejected?
N
428
Challenged?
N
430
Accepted?
Y
G
Y
Y
427
Display Message
F
H
H

FIG. 4B

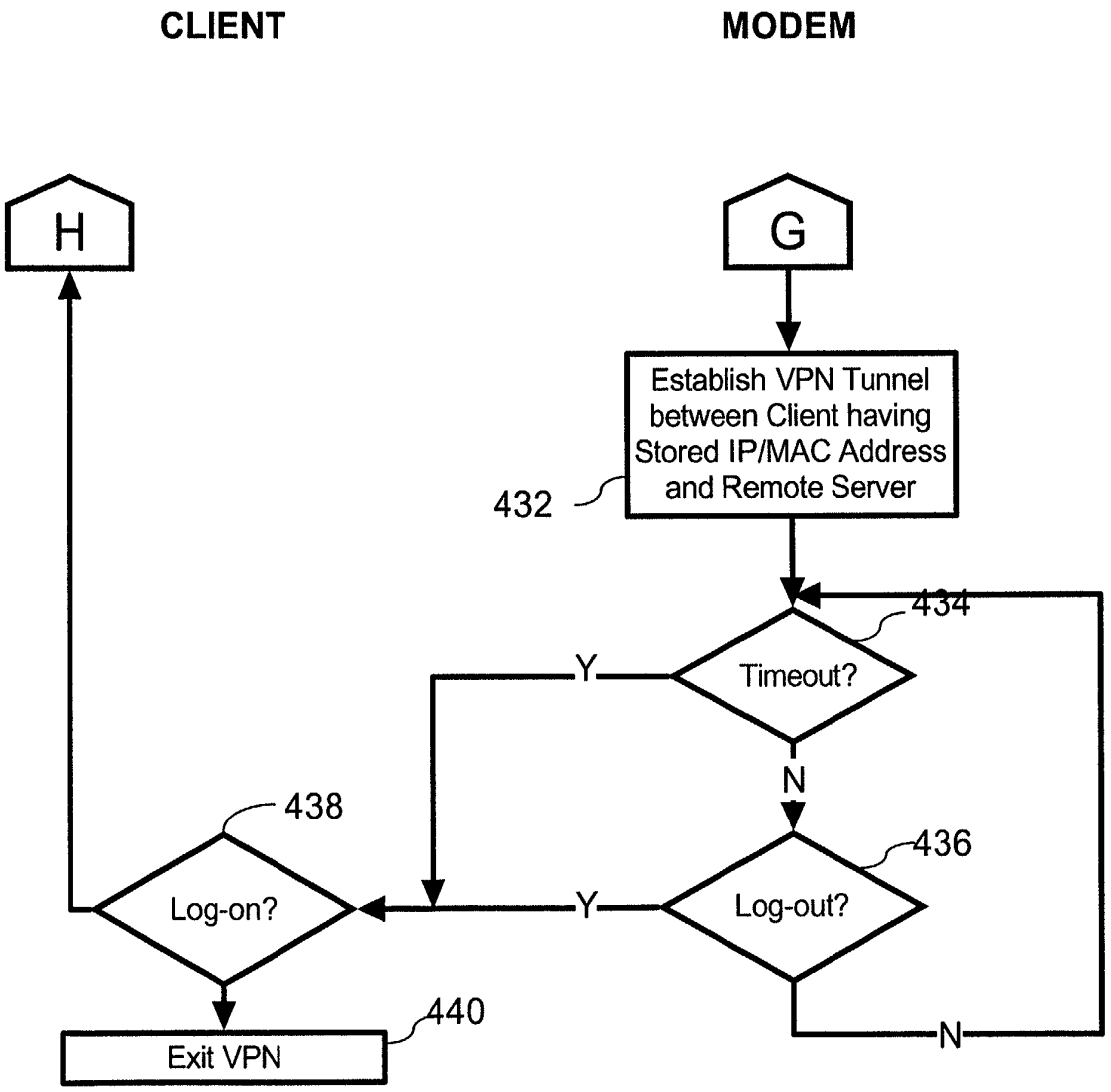
CLIENT
MODEM
SERVER-SIDE SYSTEM
H
G
Establish VPN Tunnel between Client having Stored IP/MAC Address and Remote Server
432
434
Timeout?
Y
N
438
Log-on?
436
Log-out?
Y
N
440
Exit VPN

FIG. 4C

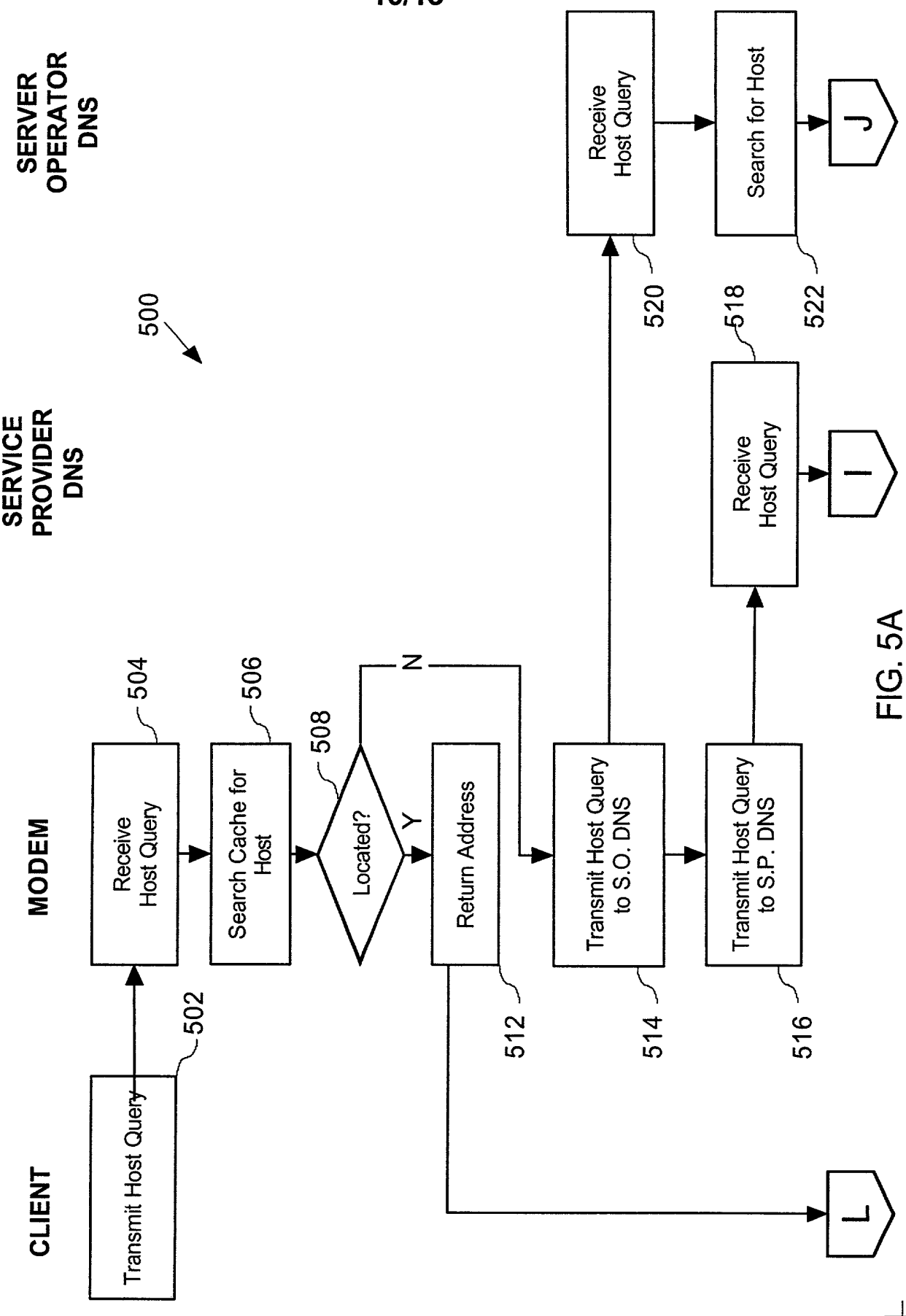
CLIENT
MODEM
SERVICE PROVIDER DNS
SERVER OPERATOR DNS
500
Transmit Host Query
502
Receive Host Query
504
Search Cache for Host
506
Located?
508
Y
N
Return Address
512
Transmit Host Query to S.O. DNS
514
Transmit Host Query to S.P. DNS
516
Receive Host Query
518
Receive Host Query
520
Search for Host
522
L
I
J

FIG. 5A

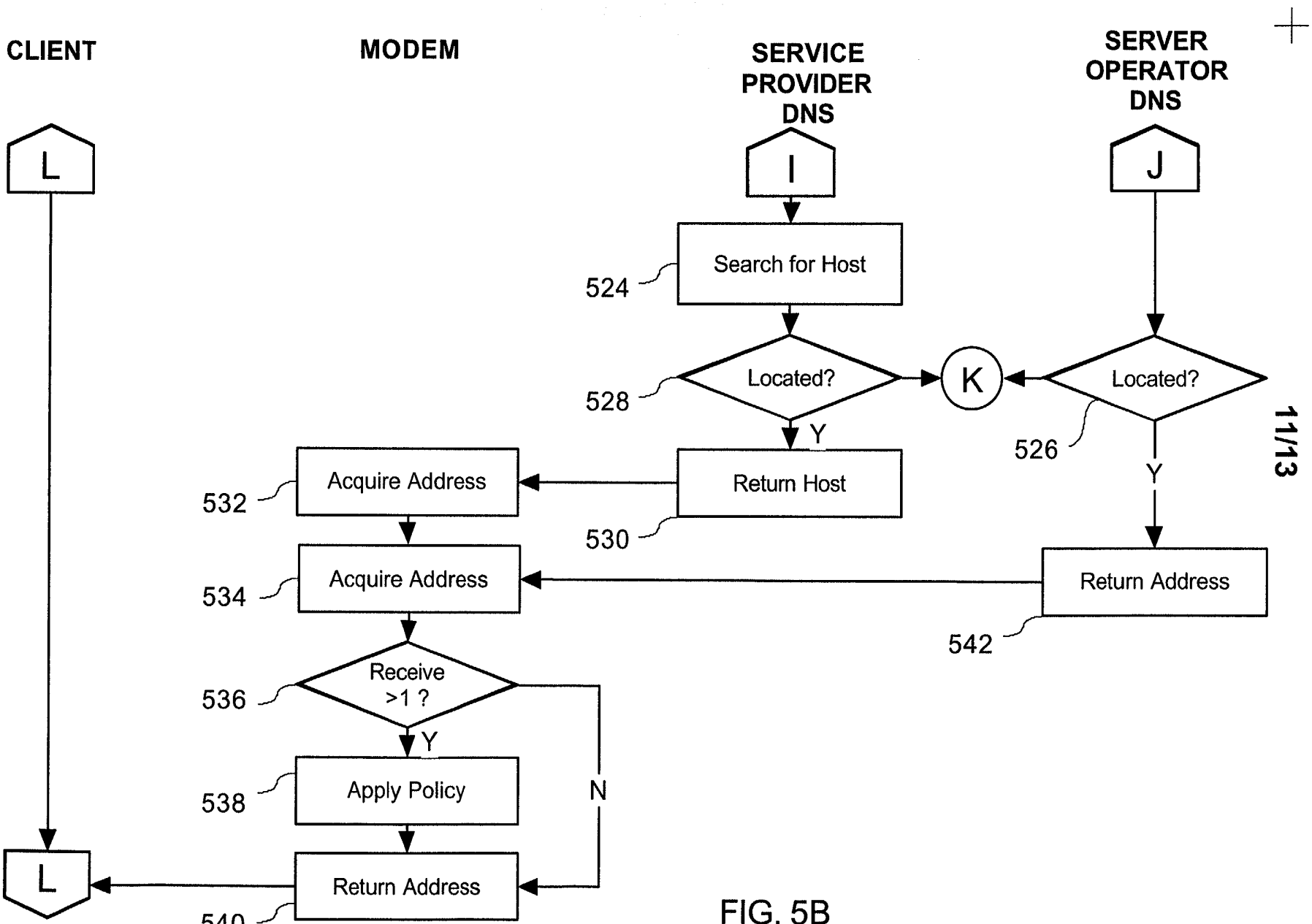
CLIENT
MODEM
SERVICE PROVIDER DNS
SERVER OPERATOR DNS
L
I
J
Search for Host
524
Located?
528
K
Located?
526
Y
Y
Return Host
530
Acquire Address
532
Acquire Address
534
Return Address
542
Receive >1 ?
536
Y
N
Apply Policy
538
L
Return Address
540

FIG. 5B

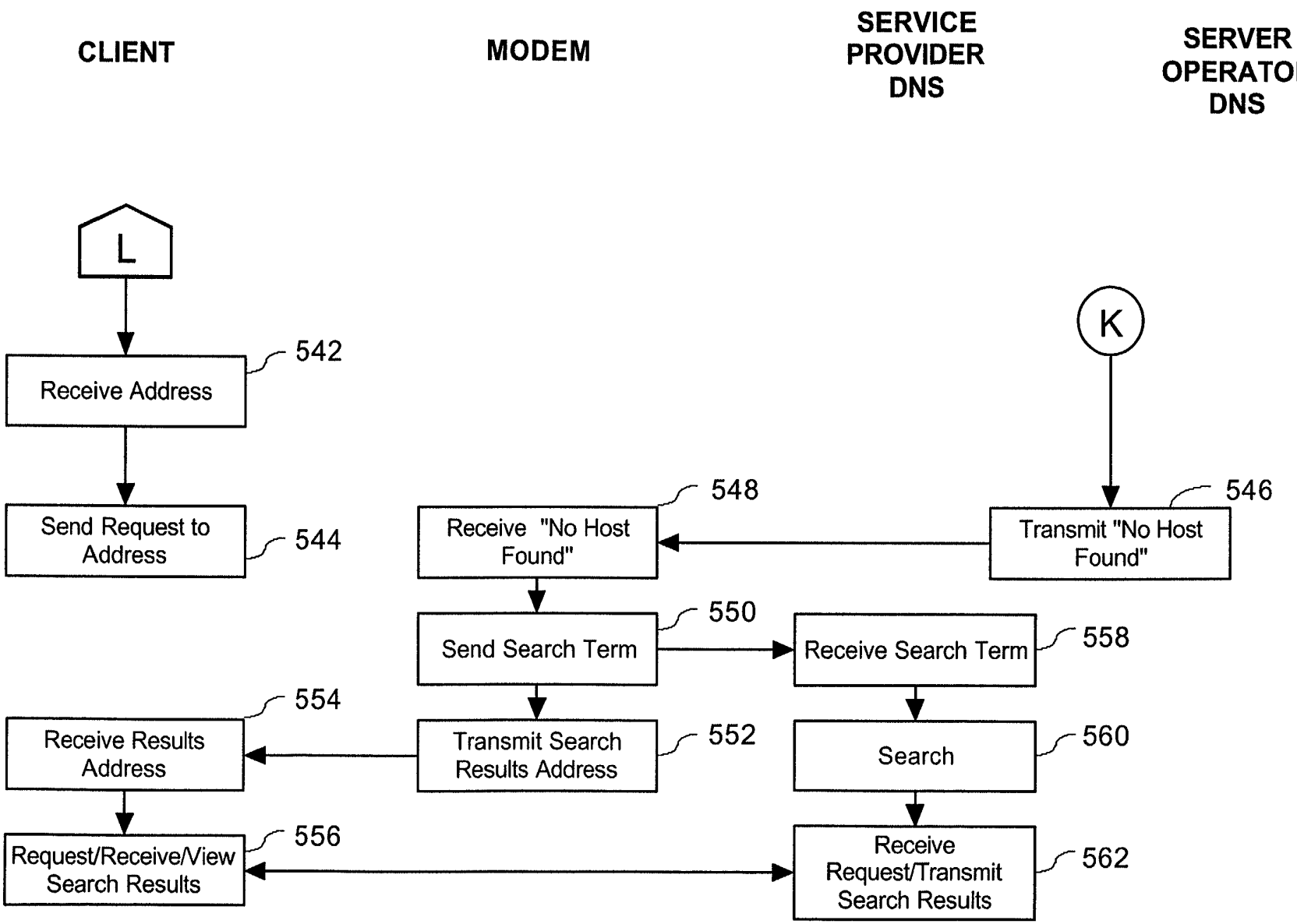
CLIENT
MODEM
SERVICE PROVIDER DNS
SERVER OPERATOR DNS
L
K
Receive Address
542
Send Request to Address
544
Receive "No Host Found"
548
Transmit "No Host Found"
546
Send Search Term
550
Receive Search Term
558
Receive Results Address
554
Transmit Search Results Address
552
Search
560
Request/Receive/View Search Results
556
Receive Request/Transmit Search Results
562

FIG. 5C

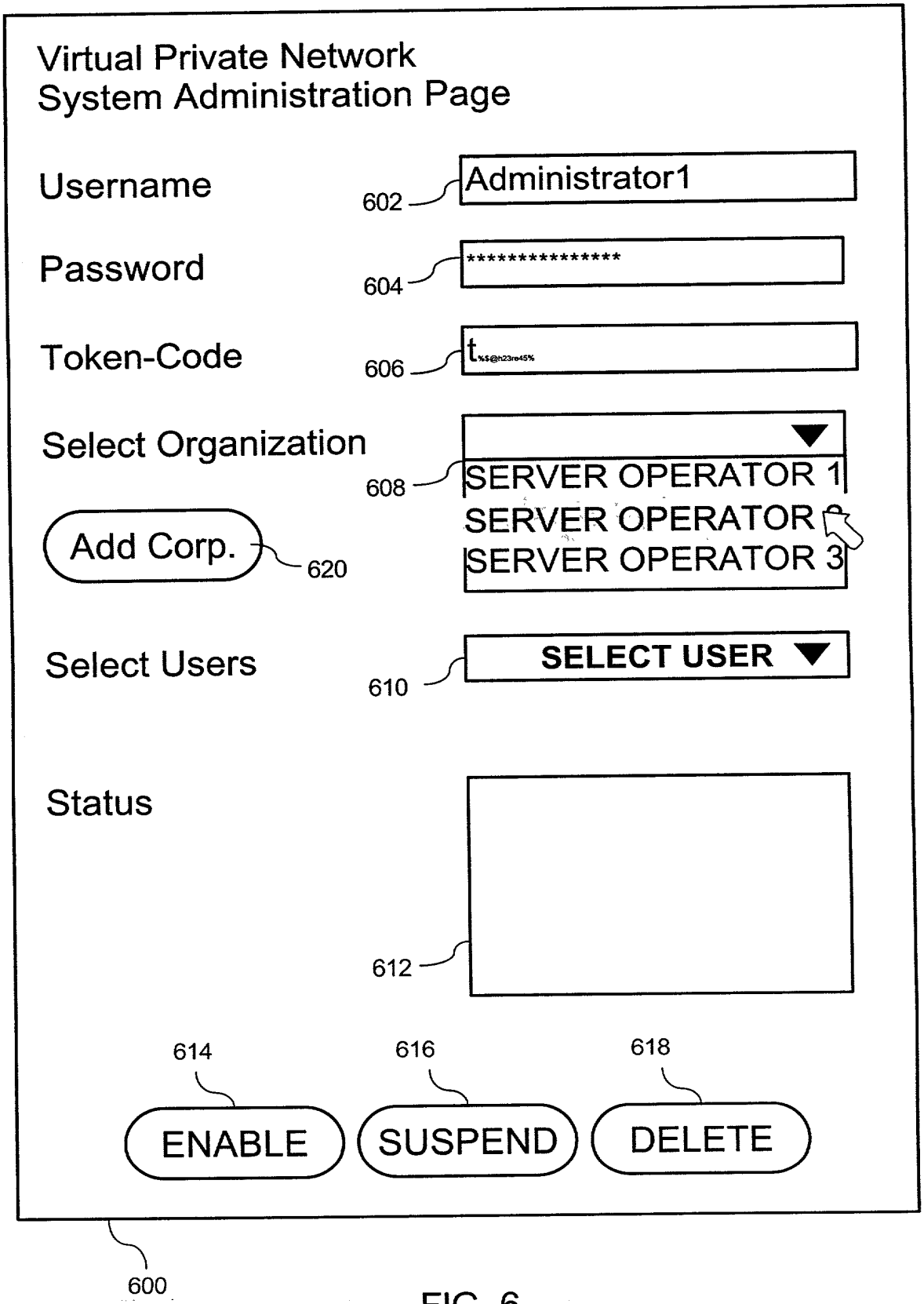
Virtual Private Network
System Administration Page
Username
602
Administrator1
Password
604
****
Token-Code
606
Select Organization
608
SERVER OPERATOR 1
SERVER OPERATOR 2
SERVER OPERATOR 3
Add Corp.
620
Select Users
610
SELECT USER
Status
612
614
616
618
ENABLE
SUSPEND
DELETE
600

FIG. 6